GADC In-Kind Input Access Evaluation

Final Report

September 2016

TechnoServe R&D Coalition

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Executive Summary

This report presents the results of the Gulu Agricultural Development Company (GADC) In-Kind Input Access (IKIA) impact evaluation. GADC, an agribusiness based in Gulu, Uganda, implemented the IKIA intervention under the TechnoServe R&D Coalition to improve farmer livelihoods and increase the agribusiness' bottom line. The project focuses on increasing the proportion of GADC farmers planting hybrid maize.

The motivation behind this intervention is the hypothesis that farmers will be more likely to invest in a productive input during harvest season—when they have cash available—rather than during planting season after a dry period in which farmers may have spent their money on non-productive consumption. The intervention may also help present-biased farmers overcome procrastination problems. Adoption of hybrid maize seed, and potentially other productive inputs, should lead to higher maize yields and greater profit for farmers and for GADC.

The evaluation estimates the impact of offering hybrid maize seeds for purchase at GADC stores on planting of hybrid seeds. Farmers have the opportunity to purchase seeds when they sell their crops to GADC (essentially receiving in-kind payment for crops). The evaluation is an individual-level randomized controlled trial (RCT) with 996 farmers at 16 GADC stores. IDinsight enumerators conducted short surveys with farmers selling any crop to GADC and randomly offered about 50% of participants the opportunity to purchase a two-kilogram bag of hybrid seed in January 2016. An endline survey in May / June 2016 assessed hybrid maize adoption across the two study arms after farmers had planted maize.

Main evaluation results:

- **The intervention increased the proportion of farmers planting reliable hybrid maize by 40% (8 percentage points).**
- **Although only 16% of farmers accepted the offer to purchase maize, purchasers were more likely to plant reliable hybrid maize by 47 percentage points. This could suggest that the intervention would be much more successful if it was modified to improve acceptance of the offer to purchase hybrid seeds.**
- Acceptance of the offer to purchase hybrid maize seed was correlated with knowledge of maize agronomy and value of crops sold to GADC.
- Sub-sample analysis suggested the effect size of the intervention on adoption of reliable hybrid maize was larger for:
    - Farmers selling cotton or maize (compared with sesame).
    - Farmers in Gulu and Nwoya district (compared with Amuru district).

Operational findings on sourcing, transport, storage, seed quantity, and accounting, are relevant to any potential scale-up as well as to other companies that may be interested in testing this intervention.

Despite these positive results, contextual factors likely limited the results from being even stronger. For instance, this intervention was implemented during a time when farmers were selling few crops,

meaning they had little revenue with which to purchase maize. Additionally, many farmers were unaware that the maize seed was available.

Further, under-sampling of cotton farmers (due to the time of year when the survey took place), non-compliance, and potential for spillover likely caused the evaluation to underestimate the true effect of the intervention.

Recommendations

IDinsight recommends scaling up the intervention at GADC. Findings from the evaluation suggest that the intervention is effective at increasing planting of reliable hybrid maize. Further, the low cost (with potential for profitability through higher crop yields and positive margins from reselling productive inputs) and meaningful effect size imply a cost effective intervention that can be integrated into existing business models.

The main principle of this intervention can be applied to other productive agricultural inputs beyond hybrid maize. The evaluation suggests that the method (providing farmers with in-kind access to productive inputs) is viable and impactful. **IDinsight recommends exploring possibilities to implement interventions with similar principles but using other productive inputs – both at GADC (if interest is present) and with similar companies.**

The evaluation results suggest that there is still a lack of awareness surrounding the value of high-quality hybrid seeds, especially in Amuru district. **GADC can address this by emphasizing the benefit of hybrid seeds using trainings and by sharing information through the extension system.**

Introduction

This report presents results from the Gulu Agricultural Development Company (GADC) In-Kind Input Access (IKIA) impact evaluation. The purpose of the report is to (1) inform TechnoServe and GADC of evaluation findings and (2) provide programmatic recommendations based on evidence generated from the evaluation.

This evaluation was completed under the TechnoServe Contract Farming R&D Coalition. TechnoServe selected three agribusinesses to receive a matched grant of up to 500,000 USD to explore innovations that could benefit farmer livelihoods and the companies' bottom line. The innovations are coupled with impact evaluations conducted by IDinsight. Lessons from the innovations will be shared among Coalition members.

GADC – one of the companies selected as part of the Coalition - is an agribusiness located in the town of Gulu in northern Uganda. The company purchases organic cotton, sesame, chili, and sunflower (as well as conventional cotton) from a network of more than 40,000 farmers. With the support of the matched grant from TechnoServe, GADC has started purchasing non-organic maize from its farmers.

Intervention Overview

GADC offered hybrid maize seeds for purchase to a random sub-sample of farmers when the farmers sold their crops to GADC. Hybrid seeds are one type of improved seed variety, and are created by breeding two different inbred parent lines with desired characteristics to combine into a higher-yielding hybrid.

The motivation behind this intervention is the hypothesis that farmers will be more likely to invest in a productive input during harvest season—when they have cash available—rather than during planting season after a dry period in which farmers may have spent their money on non-productive consumption. The intervention may also help present-biased farmers overcome procrastination problems. Hybrid maize seed is a productive input whose adoption should lead to higher maize yields and greater profit for farmers and for GADC.

The intervention took place from January 15th to February 5th, 2016. Hybrid seeds were sourced by GADC from Equator Seeds and sold for 11,000 Ugandan Shillings, approximately $3.26[1], for a two-kilogram bag[2]. This bag size was determined by GADC and was sufficient to cover 20 to 25 percent of an acre. Given the relatively small quantity of seed, the primary objective of the intervention was not to have a measurable impact on maize yield, but rather to increase the number of farmers adopting this improved input. Even if farmers only used a small quantity initially, farmers may increase the quantity once they observe the productivity increase from using reliable hybrid seeds.

The target population for the intervention is all GADC farmers. Only farmers that sold a crop to GADC received the offer to purchase hybrid maize seeds.

[1] Exchange rate of 1 UGX = 0.000296470 USD. Source: Xe.com. Accessed September 2, 2016.
[2] This equates to a cost of 5,500 UGX / KG for high-quality hybrid seed. For comparison, non-hybrids can be purchased from local markets for as cheap as 500 UGX / KG.

Since farmers were unable to purchase a larger quantity of seeds, the evaluation is testing whether the intervention has an impact on farmers trying (planting any quantity of) hybrid seed rather than impact on scale of adoption or maize production.

The cost of the intervention was minimal since seeds were sold (not given away) and seed distribution and storage was effectively integrated into existing operational processes. In-kind input access could even be profit generating for GADC (or other companies) if inputs are priced to cover the cost of transport and storage. Additionally, companies benefit from use of improved inputs through greater crop yields among farmers. However, as noted by GADC, there is a reputational risk in selling seeds directly through GADC, as farmers may blame GADC for any problems they experience.

This evaluation's implications extend to other productive inputs, beyond hybrid maize seed. If cash availability is a significant barrier to the adoption of more costly (and productive) inputs, offering inputs for sale when farmers sell crops could lead to greater adoption of productive technology. Farmers would benefit from higher yields and greater profit, while GADC (or other companies) would benefit from increased production. Studies of similar interventions from other contexts indicate that similar interventions are likely to be effective in other contexts (see literature review).

The intervention has implications for the contract farming model of extending inputs to farmers on credit. Contract farming typically involves farmers receiving inputs on credit during planting season and then having the value of these inputs subtracted from their sales at the end of the season. The problem is that this model often suffers from low repayment rates and incentivizes side-selling (Prowse 2012). Agribusinesses could provide in-kind input access as a viable alternative to extending inputs on credit.

Literature Review

Agricultural production and yields in developing countries have lagged far behind those in developed countries for several decades. Many experts see the underutilization of improved agricultural inputs as one of the primary reasons. Despite decades of agricultural policies that promoted the adoption of agricultural technology as ways of improving productivity, smallholder farmers have been relatively slow to adopt the new technology (Nyangena et al. 2014).

There is compelling evidence that hybrid seeds have a substantial impact on yield, farmer profit, and farmer welfare. Kathage et al. find that hybrid adoption leads to 50 – 60% net yield gains in Tanzania, farmer profit increases of 45 – 50%, and a 17% increase in household living standards (2012). Other researchers have found similar sized effects to hybrid seed adoption (Mathenge et al. 2012). In Kenya, researchers found that not only were hybrid yield significantly higher, but the variance in yield was much lower, reducing farmer exposure to extremely low yields (Suri 2011; Jones et al. 2012).

Some researchers have found that the marginal value of hybrid seeds depends on the complementary use of inorganic fertilizer (Nyangena et al. 2014). While hybrid seeds have a positive effect on yield on their own, the effect is substantially larger when combined with fertilizer.

The literature suggests two main explanations for farmers' lack of adoption of improved inputs (such as fertilizer and improved seed varieties) in developing countries: (1) present-biased decision-making, and (2) cash availability constraints.

Present-biased decision-making. Some experts have suggested behavioral biases may limit profitable investments in agricultural technology by farmers in developing countries. Present-biased decision-making can cause farmers to fail to make high return investments. Researchers have found evidence that farmers with greater measured "present-bias" are more likely to have self-control problems in their budget allocations (Gine et al. 2015).

"Commitment devices" are a series of interventions that permit individuals to lock themselves today into the action that they want to take tomorrow. Examples of commitment devices in our everyday lives include signing up for gym classes at a specific time instead of hoping to stop by after work or locking ourselves into auto-withdrawals for retirement savings. Commitment devices have the potential to affect decision-making by addressing both behavioral biases and irregular cash flows (Alcott et al. 2010).

Much of the research that economists have done relating to commitment devices is focused on savings' decisions. One example from Ashraf et al. (2006) finds that a "commitment savings account" in the Philippines, in which customers were not allowed to access their own savings until a time in the future that they specified, caused people to increase savings rates by 82 percent.

Within agriculture, Brune et al. (2015) show that giving farmers in Malawi the opportunity to have their cash crop harvest proceeds deposited directly into a new bank account led to higher savings and raised agricultural input usage in the next season.

Cash availability constraints. At GADC, IDinsight's Maize Survey in July of 2015 found that nearly all GADC farmers (97%) would be interested in an intervention that makes hybrid seeds more accessible. The primary constraint was the high cost of seeds and cash availability (followed by distance to seller and a general "lack of access). These are obstacles that GAC can address through an in-kind payment intervention that provides farmers access to seed when farmers have money available (and without having to pay transport costs into town).

In the study most relevant to this evaluation, Duflo, Kremer and Robinson (2011) find that offering small, time-limited reductions in the cost of purchasing fertilizer at the time of harvest increases fertilizer use by 46 to 60 percent. Time-limited discounts can potentially help present-biased farmers overcome procrastination problems, while also ensuring that farmers have cash availability for investment in productive inputs. The discount offered is small - they charge the same price but offer free delivery – but sufficient to significantly increase farmer adoption of fertilizer. This evaluation provides a useful proof of concept for this input distribution method, but it tests the concept in a highly controlled, theoretical context.

This evaluation builds on the Duflo et al. evaluation to test whether an agribusiness, GADC, can improve productive input adoption among its farmers by offering farmers the opportunity to purchase hybrid maize seeds at the point of sale. It contributes to the literature by testing this concept in an applied business setting, with different inputs, and in a new context.

Research Questions and Outcomes

The IKIA impact evaluation measures the impact of offering hybrid seeds for purchase at GADC stores. There are two primary outcomes:

1) **Uptake of hybrid seed offer**: Do farmers purchase hybrid maize seed from GADC when offered the opportunity to do so?

2) **Planting of reliable hybrid seed**: Does the intervention lead to higher planting of *reliable* hybrid maize seed?

Planting of "*reliable*" hybrid maize seeds is defined as planting seeds that meet all of the following characteristics: (1) farmers identify as hybrid seeds, (2) come from a reliable source (NGO, store, or government), (3) were recently obtained (less than 6 months before planting), and (4) if purchased, were purchased at a price above 2,000 Shillings[3] per KG[4].

This methodology was developed by talking to local experts and by piloting questions in the baseline survey. A rigid definition of *reliable* hybrid seed was necessary because many farmers believe they are using a hybrid seed, when in fact they using cheap, low quality seeds that are only marketed as hybrids.

Evaluation Methodology

Evaluation Design

The evaluation is a two-arm RCT with randomization at the level of the individual. Farmers were assigned to treatment and control groups according to the following protocol:

Treatment Group	Farmers who are randomly selected to receive the sale offer of hybrid maize seed.
Control Group	Farmers who are randomly selected to not receive the sale offer of hybrid maize seed.

Survey Sampling and Data Collection

The baseline sampling took place at GADC stores and only included farmers that sold a crop to GADC. IDinsight was in Gulu from January 15th to February 5th - when GADC farmers brought any crop to sell to GADC, they were invited to complete a brief survey that covered demographics and farming behavior. This survey was tablet-based and included an automated "lottery" component: for a random 50% of farmers the survey included the offer to purchase a 2kg bag of hybrid seeds.

[3] This price point was determined to be a suitable (and conservative) cut-off based on discussions with local seed sellers, the GADC agronomist, and the GADC field team.
[4] Unless the seeds were subsidized by an NGO.

A team of seven IDinsight enumerators ran the intervention at 16 randomly selected GADC stores (see Table 1). Note that some locations have very few surveys – this was due to few farmers selling crops to GADC in those areas.

Table 1: Survey Locations

Buyer	District	Baseline Surveys	Endline Surveys
Nono Richard	Amuru	59	58
Ocitti Martine	Amuru	34	34
Okeny Peter	Amuru	66	60
Okiya John	Amuru	1	1
Oneka Moses	Amuru	78	78
Abwoye George	Gulu	69	68
Ojok Justine	Gulu	92	90
Okot Samuel	Gulu	59	59
Omara Ceasor	Gulu	80	80
Orech Morish	Gulu	79	77
Oyet Geoffrey	Gulu	86	83
Anywar Simon	Nwoya	61	61
Obita Patrick	Nwoya	3	3
Okumu G William	Nwoya	89	84
Opiyo Micheal	Nwoya	88	86
Rachkara Moses	Nwoya	52	52
TOTAL		**996**	**974**

A total of 996 farmers were surveyed during the baseline, and 481 farmers received the offer to purchase hybrid maize seeds (treatment arm). Ninety-eight percent (974 out of 996) of farmers surveyed at baseline were also surveyed at endline. Out of the 22 (2% of surveyed farmers) that were not surveyed at endline, 15 were confirmed moved or passed away dead, while the field team was unable to locate 7 farmers.

Results

Primary Analysis

Uptake of Offer

Uptake of hybrid maize seed by farmers who received the offer was 16% (75 of 481 farmers in the treatment arm). The primary reasons cited by farmers who refused the offer were: "not enough money" (70%) and "need to discuss with family first" (18%).

Several variables were correlated with acceptance of the offer[5]:

- **Maize knowledge: Seeds per hole**. Farmers who knew the correct number of seeds per hole when planting maize were 5 percentage points more likely to accept the offer to purchase hybrid maize seeds. This suggests that farmers with greater knowledge of maize agronomy are more likely to invest in productive inputs.
- **Maize knowledge**: **Kilograms of seed per acre**. Farmers who knew the correct quantity of kilograms of maize seed to plant per acre were 6 percentage points *less likely* to accept the offer to purchase hybrid seeds. Note that this question may have been capturing mathematical ability (as it required some mental math) rather than knowledge of maize agronomy.
- **Value of crops sold to GADC.** Farmers who sold a larger quantity of crops to GADC (and received more money) were more likely to accept the offer. A 10% increase in the value of crops sold to GADC increased the probability of accepting the offer by .3 percentage points. This suggests that farmers who are less cash constrained are more likely to invest in productive inputs, but only slightly. Using additional functional forms to model the relationship suggests that the size of the effect decreases with larger crop sales (i.e. the larger the value of the crop sale, the less the value influences acceptance of the offer).

Planting of reliable hybrid maize seed

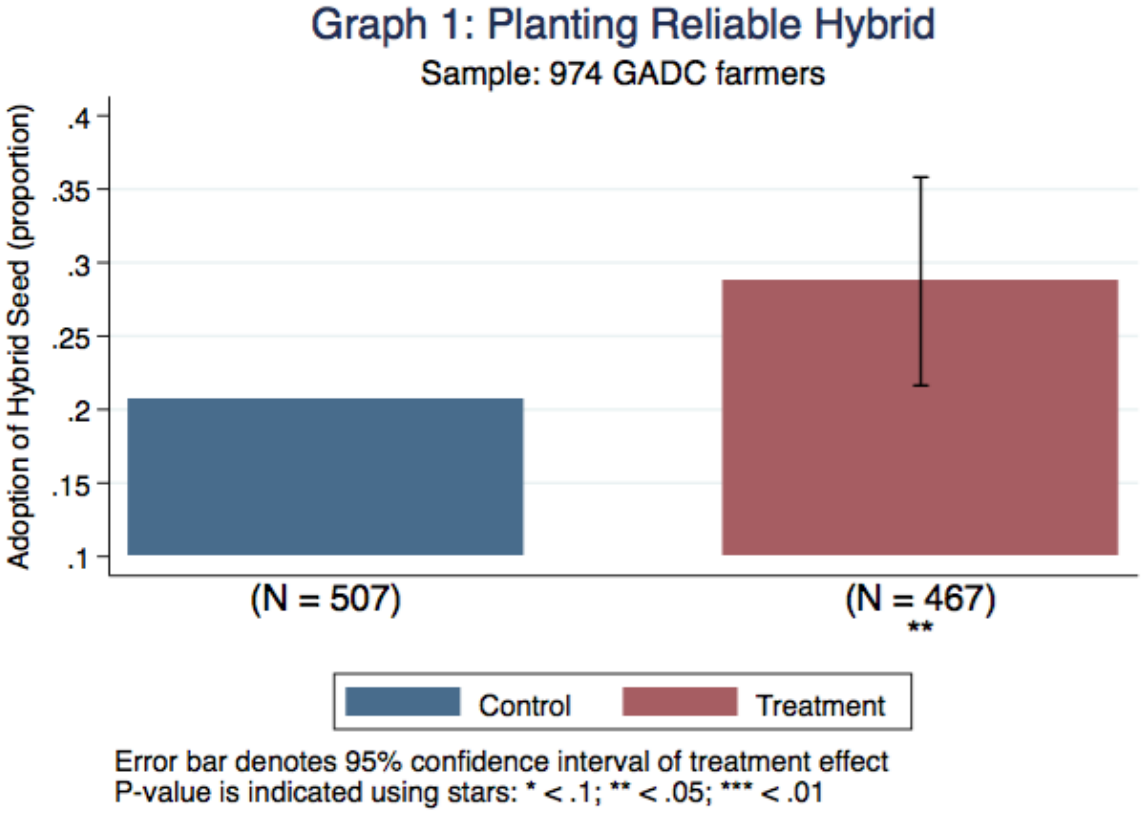
This analysis examines the effect of the intervention on farmers' planting of reliable hybrid maize seed. Regression tables, the statistical model, and descriptive statistics can be found in the Appendix.

Intention-to-treat

Intention-to-treat analysis estimates the effect of *offering* farmers hybrid maize seed.

Graph 1 shows the difference in farmers' planting of hybrid maize seed between the treatment (those who received the offer) and the control (those who did not). Twenty-eight percent of farmers in treatment areas planted hybrid maize, while 20% of farmers in control areas planted maize. **The intervention increases the proportion of farmers planting hybrid maize by 40% (8 percentage points).** This estimate is robust to the addition of additional controls (i.e. the coefficient remains virtually the same).

[5] The regression table can be found in the appendix.



Treatment-on-the-treated

Treatment-on-the-treated (TOT) analysis estimates the effect of the intervention on farmers who *accepted* the offer. The difference between intent-to-treat (ITT) analysis, examined above, and TOT analysis, is that ITT estimates the treatment effect for farmers who *received the offer*, while TOT estimates the treatment effect for farmers who *accepted the offer*. Farmers who accepted the offer were 47 percentage points more likely to plant reliable hybrid maize than farmers who did not receive the offer[6]. This suggest that for around half of the purchasers the intervention induces them to try hybrid seed, but the other half would have planted hybrid seed even without getting access from GADC. It is unclear if these results would extrapolate to la larger population, but they suggest that if more people were induced to purchase (due to changes in price, marketing, or sales timing), the intervention would have a much larger effect.

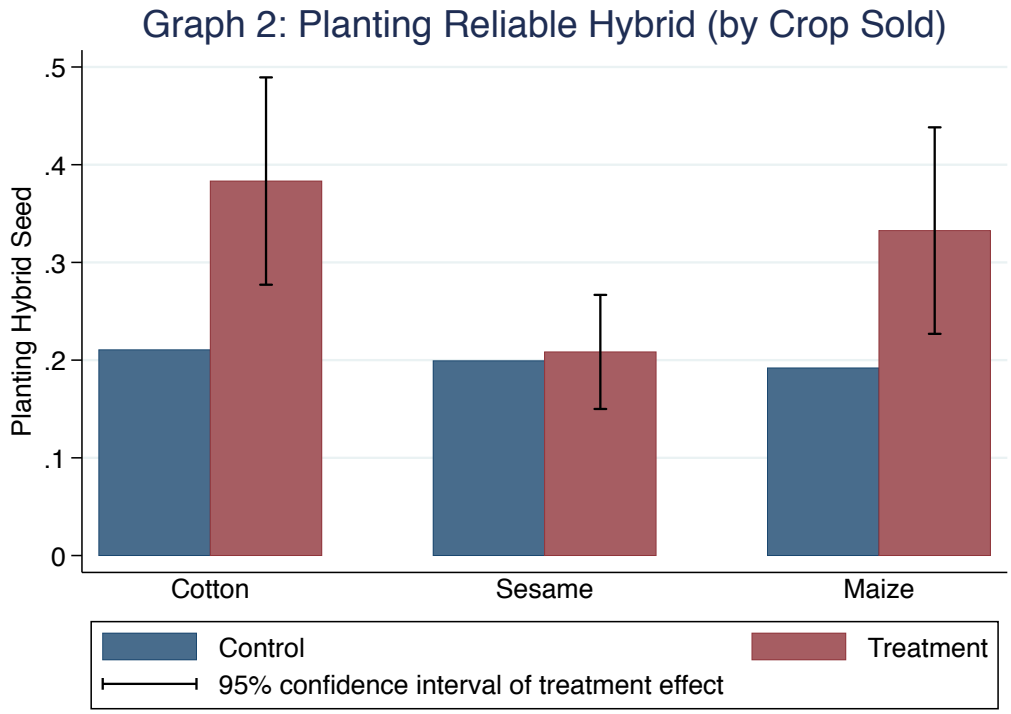
Secondary Analysis

Secondary analysis examines the effect of the intervention on different sub-groups to get a better sense of how the intervention may have had a differential impact depending on certain farmer characteristics. Note that the sample sizes are smaller when doing sub-sample analysis, making it more difficult to detect statistically significant effect sizes. As such, results from sub-sample analysis should be seen as suggestive and should be interpreted cautiously.

[6] Regression table can be found in the Appendix.

The graphs below illustrate sub-sample differences. The differences in coefficients are statistically significant, unless noted otherwise. Regression tables for each sub-sample are included in the Appendix.

Farmers selling different crops to GADC

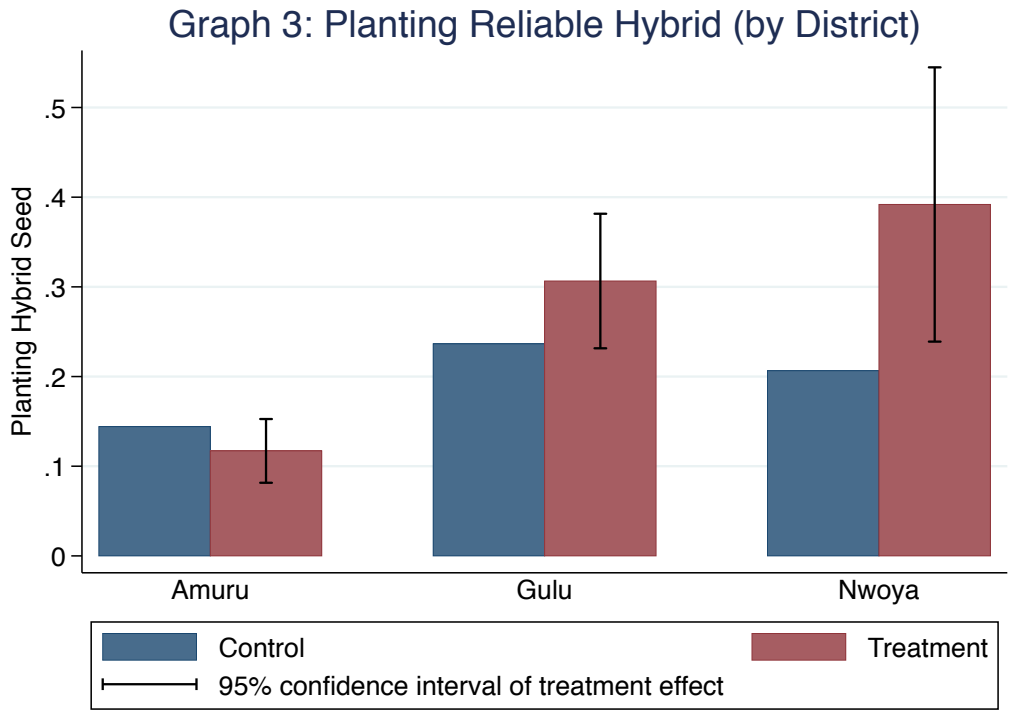


In the absence of the intervention (i.e. in the control group), farmers selling maize, cotton, or sesame to GADC plant reliable hybrid maize at roughly similar rates[7]. The effect of the intervention, however, differed depending on which crop the farmer is currently selling to GADC (when he / she receives the offer). The intervention increased the proportion of farmers planting hybrid maize by 17 percentage points for farmers selling cotton, and 14 percentage points for farmers selling maize. The intervention had no effect on farmers selling sesame to GADC.[8]

It makes sense that the intervention would be more effective among farmers selling maize (since the productive investment is for maize), but it is not clear why it is more effective for farmers selling cotton (compared with sesame). High cotton prices during the season suggest that cotton farmers may have been more willing to make an investment in productive inputs this season. Sesame, on the other hand, had a lower price compared with previous seasons. Cotton farmers also made larger sales on average (receiving 71,000 UGX on average, compared with 42,000 UGX for sesame farmers) meaning they had more liquidity to purchase productive inputs.

[7] The sample size for farmers selling chili or sunflower was too small to include in sub-sample analysis.
[8] The effect is slightly positive, but statistically insignificant.

District-level analysis



In the absence of the intervention, farmers in Gulu (23%) and Nwoya (20%) districts plant hybrid maize at higher rates than farmers in Amuru (14%). The effect of the intervention is also significantly larger in those areas – a 7 percentage point increase in Gulu, and a 19 percentage point increase in Nwoya, compared with no effect in Amuru.[9] The differences are robust to the addition of controls. These results suggest that there may be additional barriers to planting hybrid maize in Amuru.

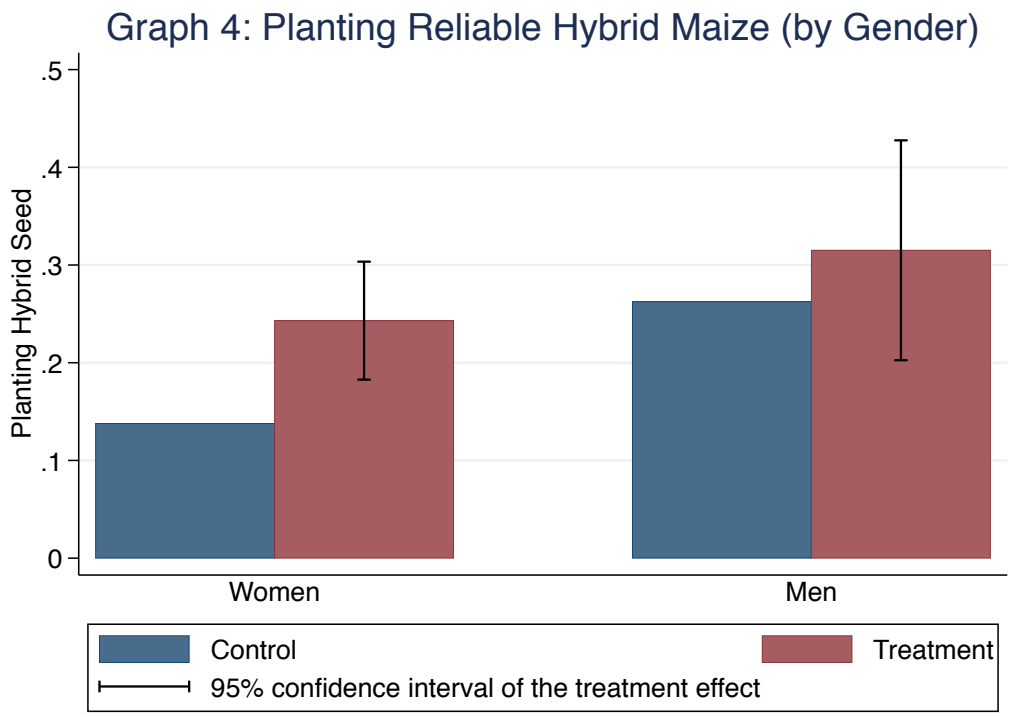
Eighty-six percent of farmers in Amuru who refused the offer cited the expensive cost of the seeds as the primary reason for their refusal. Knowledge of maize agronomy was lower in Amuru (25% answered the correct number of maize seeds per hole, compared with 39% and 34% in Gulu and Nwoya, respectively), suggesting that awareness of the value of hybrid may be lower. If farmers are unaware of the benefits of hybrid seeds, they may consider them too expensive given the perceived lower benefit. Increasing awareness about the value of hybrid seeds, through trainings and the extension system, is one method that will likely increase the proportion of farmers planting hybrid seeds in Amuru.

The large effect size in Nwoya district appears to be driven by two stores where farmers accepted the offer to purchase hybrid seeds at particularly high rates. Thirty-eight percent of farmers at Opiyo Micheal's store and 27% of farmers at Rachkara Moses' stores accepted the offer (compared with an average of 16% across all stores). Farmers at these stores scored well on the primary indicator of maize agronomy knowledge (knowledge of the correct number of maize seeds per hole) – 59% of

[9] The effect in Amuru is actually slightly negative, but statistically insignificant.

farmers at Opiyo Micheal's store and 48% of farmers at Rachkara Moses' store answered the question correctly (average was 35%). One hypothesis is that field officers at these stores emphasized the value of hybrid seeds particularly strongly during training, leading to more farmers accepting the offer to purchase hybrid seeds.

Gender



In the absence of the intervention, a higher proportion of men than women plant hybrid maize. Twenty-six percent of men plant hybrid maize, compared with 13% of women. This suggests that women may face greater obstacles to accessing improved inputs like hybrid seeds than men.

There are subtle indications that the intervention has a larger effect on women (an increase of 11 percentage points) than men (5 percentage points), but the results are not statistically significant (for cost-effectiveness purposes, the evaluation is not designed to detect such differences).

Operational Findings from Intervention Implementation

In addition to the evaluation impact findings, IDinsight also had several operational findings from the implementation of the intervention. These findings may be useful to other companies that are interested in implementing a similar intervention. Operational findings can be broken down into five categories: sourcing, transport, storage, seed quantity, and accounting.

- **Sourcing** – GADC picked a well-known seed provider that was reliable and transparent. No farmers refused the offer because of a lack of trust or transparency in the sourcing process. Reliable sourcing of hybrid seeds is an important component of the intervention. Hybrid seeds need to come from a source known to farmers, with transparent labeling and clear accountability.

- **Transport** – The logistics of transporting seeds to purchasing depots were coordinated by GADC. GADC is experienced in managing transport logistics in its catchment area. In a scale-up scenario, inputs could be transported using regularly scheduled trucks that are picking up crops.

- **Storage** – GADC buyers were responsible for finding a place to store seeds close to their stores. Before the intervention, there were some concerns around seed storage, as hybrid maize seeds need to be stored in a separate location from any organic produce for certification reasons. During the intervention, storage did not appear to be a problem – buyers were all able to find a suitable location for storage.

- **Accounting** – Accounting was handled completely by IDinsight's survey team. While the buyer stored the seeds, the enumerators were responsible for collecting cash payment and creating a receipt of each transaction. This process went smoothly, but it should be noted that this will place an additional burden on buyers if the intervention is scaled-up or implemented in a different location (without IDinsight present).

Discussion

Limitations of Study

This section covers potential limitations of the study relating to generalizability of results and accuracy of the impact estimate.

Generalizability of the study to other contexts

Other companies may be interested in making input sales to smallholder farmers when purchasing crops. There were several context-specific factors that affected take-up and feasibility of the intervention:

- **Size of Average Crop Purchase** – Qualitative interviews suggest that farmers are selling crops in small quantities and for a specific purpose (an upcoming health or education expense, for example). The data support this interpretation: 39% of farmers who received the offer sold crops for less than 11,000 shillings (the price of the maize seed) and 62% of farmers who received the offer sold their crops for less than 30,000 shillings. Rather than selling all of their harvest at once, farmers "saved" in the form of crops until they needed a limited amount of cash for a specific purpose. Therefore, many farmers did not have capacity to pay for even a small quantity of hybrid seed. This could have moderated the impact of the intervention. This intervention is likely to be most successful in areas where farmers sell most of their crop at once or in large quantities.

- **Farmer knowledge of maize agronomy**. There is suggestive evidence from the evaluation that farmers who correctly answered a question on maize agronomy (correct number of seeds per hole) were more likely to accept the offer to purchase hybrid maize seeds[10]. This

[10] Note that the other maize agronomy question actually had a negative correlation with acceptance of offer (though this question was most likely partially measuring mathematical ability).

suggests that the intervention may be more effective in areas with high levels of maize agronomy knowledge.

- **Communication to Farmers** – During the first part of the evaluation, farmers did not know about the intervention in advance. If they had known, they might have planned to sell more crops in order to purchase seed. In the second half of intervention implementation, some farmer communication and mobilization did occur in order to hit the sample size target. Effective communication with farmers should maximize the impact of the intervention. Additionally, the intervention was only carried out during a portion of the buying season. With awareness and greater time to prepare, farmer take-up of the offer in other contexts or a scale-up scenario could be significantly higher.

- **Time between Input Sales and Planting** – Storing seeds can be a major challenge for farmers. Many farmers don't have a location for proper seed storage or are not aware of best practices in seed storage. The longer the gap between input sales and planting, the less likely farmers are to (1) accept the offer, and (2) be able to properly store seeds. During this intervention, input sales occurred approximately 2-3 months before planting – while some farmers cited this as a reason for not purchasing seeds, it does not appear to have been a major bottleneck to acceptance of the offer.

Accuracy of impact estimate

There are three reasons to believe that the evaluation may have underestimated the true impact of the intervention: representativeness of surveyed farmers, spillovers, and non-compliance.

Representativeness of surveyed farmers

The sample of farmers that was surveyed for the purposes of this evaluation should largely be representative of farmers that sold to GADC during the *time period of the evaluation*. At randomly selected stores, all farmers selling to GADC while surveyors were at the store were surveyed.

However, farmers selling during that period of the year may be different from farmers who sell at other times of the year. The survey took place from mid-January to early February. Many farmers had already sold their cotton in December / early – January, so the majority of sales were from sesame / sim-sim and maize. It is likely that this survey under-sampled cotton farmers. Given the large effect size of the intervention on farmers selling cotton to GADC (farmers planting hybrid maize increased by 17 percentage points) it's likely that the evaluation is under-estimating the true impact of the intervention if rolled out to a population of all GADC farmers for the entirety of the season.

Spillovers

Potential for spillover between treatment and controls arms of the study was identified as a threat during the evaluation design. The concern was that farmers who purchased hybrid maize seed from GADC might resell or give the seed to other farmers in the community, some of whom may have been in the control group for the study.

In order to measure the extent of this threat, follow-up phone calls were conducted with farmers who had purchased seed from GADC. The follow-up survey reached 53% of seed recipients (others

didn't have phones or were out of network coverage), none of whom reported selling or giving seeds away.

There is still some risk of spillover, since (1) it was not possible to speak with all farmers, and (2) farmers may not have answered honestly, but based on this follow-up survey it appears that spillovers were not a major concern. If spillovers did exist, it would cause the evaluation to underestimate the effect of the intervention.

Non-Compliance

During the endline, IDinsight observed that there had been some contamination of the sample. GADC area coordinators accidentally distributed some of the leftover hybrid seed free of charge to Lead Farmers in study areas, some of whom were included in the sample. The problem was observed to be limited to two Lead Farmers, slightly reducing the study's ability to detect impact of the intervention. This may cause the evaluation to underestimate the true effect of the intervention.

Recommendations

IDinsight recommends scaling up the intervention at GADC. Findings from the evaluation suggest that the intervention is effective at increasing planting of hybrid maize. Further, the low cost (with potential for profitability) and meaningful effect size imply a cost effective intervention that can be integrated into existing business models.

The nature of the potential scale-up at GADC should be discussed further. GADC has expressed reservations about having their name attached to the seeds because of the reputational risk. An alternative could involve a partnership with a local seed dealer, where the GADC buyer, outside of his / her responsibilities to GADC, serves as an agent for the dealer to sell seeds directly to farmers.

The main principle of this intervention can be applied to other productive agricultural inputs beyond hybrid maize[11]. The evaluation suggests that the method (providing farmers with in-kind access to productive inputs) is viable and impactful. **IDinsight recommends exploring possibilities to implement interventions with similar principles but using other productive inputs – both at GADC (if interest is present) and with similar companies.**

The intervention may be able to provide an alternative to the traditional contract farming model of extending inputs to farmers on credit. Instead of using credit to supply inputs, businesses could provide in-kind input access to farmers as a viable alternative.

The evaluation results suggest that there is still a lack of awareness surrounding the value of high-quality hybrid seeds, especially in Amuru district. **GADC can address this by emphasizing the benefit of hybrid seeds using trainings and by sharing information through the extension system.**

Future research should further explore the relative importance of the different channels for impact – is the intervention primarily helping cash constrained farmers overcome liquidity obstacles or is it helping present-biased farmers overcome procrastination problems?

[11] When GADC farmers were asked which inputs they have the most difficulty accessing they reported the following (in order): pesticide, seeds, fertilizer, herbicide, hoes.

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Appendix

Appendix A: Statistical Models and Tables

We use a linear regression model to estimate the effect of the intervention on reliable hybrid maize seed adoption by intervention recipients (all farmers who *received* the offer, regardless of whether they accepted or not).

The treatment effect is estimated as follows:

$$Y_{1i} = \beta_0 + \beta_1 * T_i + \beta_2 * Y_{0i} + \varepsilon_i$$

where,

- Y_{1i} is a binary variable for planting any reliable hybrid maize seed
- Y_{0i} is a dummy variable for each buyer
- T_i is a binary variable for farmer-level treatment assignment
- ε_i is an error term

A balance table of baseline covariates is included below. The differences between treatment and control are not significant for any variables, which suggests that treatment and control groups are similar on these measurable characteristics prior to the intervention.

Table 2: Balance of Baseline Covariates

	Did Not Receive Offer	Received Offer	Difference	P-Value
Maize knowledge: Seeds per hole	0.325	0.370	-0.045	0.105
	(0.021)	(0.022)	(0.031)	
Maize knowledge: KGs per acre	0.254	0.259	-0.005	0.911
	(0.019)	(0.020)	(0.028)	
Farmed hybrid maize in last 12 months	0.329	0.345	-0.015	0.781
	(0.021)	(0.022)	(0.030)	
Farmed maize in last 12 months	0.848	0.824	0.024	0.447
	(0.016)	(0.018)	(0.024)	
Age	36.521	38.338	-1.818**	0.156
	(0.615)	(0.644)	(0.890)	
Male	0.556	0.540	0.017	0.918
	(0.022)	(0.023)	(0.032)	
Sold Cotton	0.262	0.238	0.025	0.957
	(0.020)	(0.020)	(0.028)	
Sold Sesame	0.515	0.503	0.012	0.189
	(0.022)	(0.023)	(0.032)	
Sold Maize	0.195	0.233	-0.038	0.160
	(0.018)	(0.020)	(0.026)	
Shillings received for crops	46233.941	51867.641	-5633.700	0.129
	(5069.805)	(7106.890)	(8621.646)	
N	507	467	974	

Note: Standard error in parentheses

Note: P-value from joint orthogonality test of treatment arms

Table 3: Determinants of acceptance of offer

	Accepted Offer
Maize knowledge: Seeds per hole	0.053
	(1.83)*
Maize knowledge: KGs per acre	-0.063
	(1.85)*
Farmed hybrid maize in last 12 months	0.070
	(1.47)
Farmed maize in last 12 months	0.067
	(1.73)
What is your age?	-0.001
	(0.55)
Male	0.020
	(0.52)
Sold Maize	-0.048
	(0.76)
Log of Shillings received for crops sold	0.034
	(3.43)***
Constant	-0.230
	(1.72)
R^2	0.17
N	467

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

The regression estimates the effect of the above variables on the dependent variable acceptance of the offer of hybrid seed. The specification uses buyer fixed effects and clusters standard errors at the buyer level. T-Statistics are in parentheses.

Table 4: Determinants of planting reliable hybrid maize

	No controls	With controls
Treatment	0.080	0.077
	(2.21)**	(2.25)**
Farmed maize in last 12 months		-0.010
		(0.20)
Farmed hybrid maize in last 12 months		0.059
		(1.71)
Log of Shillings received for crops sold		-0.001
		(0.03)
Male		0.075
		(2.52)**
Sold < 11,000 UGX in crops		-0.012
		(0.22)

Sold Maize		-0.023
		(0.57)
Maize knowledge: Seeds per hole		0.079
		(2.23)**
Maize knowledge: KGs per acre		-0.017
		(0.47)
Constant	0.201	0.120
	(11.57)***	(0.47)
R^2	0.07	0.11
N	974	974

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

The regression estimates the effect of the above variables on the dependent variable planting of hybrid maize. The specification uses buyer fixed effects and clusters standard errors at the buyer level. T-Statistics are in parentheses.

Table 5: Treatment on the Treated Analysis

	No controls	With controls
Accepted Offer	0.423	0.473
	(2.54)**	(3.02)***
Farmed maize in last 12 months		-0.019
		(0.50)
Farmed hybrid maize in last 12 months		0.042
		(1.30)
Log of Shillings received for crops sold		-0.008
		(0.51)
Male		0.068
		(2.51)**
Sold < 11,000 UGX in crops		-0.010
		(0.22)
Sold Maize		-0.009
		(0.22)
Maize knowledge: Seeds per hole		0.071
		(2.49)**
Maize knowledge: KGs per acre		-0.004
		(0.12)
Missing values: Farmed Maize		0.200
		(0.71)
Missing values: Value of crops sold		0.167
		(0.92)
1. Buyer		-0.071
		(0.92)
2. Buyer		0.033
		(0.48)
3. Buyer		-0.070
		(0.93)
4. Buyer		-0.016

		(0.20)
5. Buyer		-0.154
		(0.65)
7. Buyer		-0.043
		(0.61)
9. Buyer		-0.101
		(0.25)
10. Buyer		-0.089
		(1.01)
11. Buyer		0.126
		(1.72)*
12. Buyer		-0.048
		(0.64)
13. Buyer		0.119
		(1.50)
14. Buyer		-0.145
		(2.06)**
16. Buyer		-0.038
		(0.52)
17. Buyer		0.114
		(1.67)*
18. Buyer		0.074
		(0.92)
Constant	0.207	0.211
	(11.34)***	(1.16)
R^2	0.07	0.14
N	974	974

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

The regression uses instrumental variables to estimate the effect of acceptance of the offer (and controls) on planting hybrid maize. The specification uses buyer fixed effects and clusters standard errors at the buyer level. T-statistics are in parentheses.

Table 6: Sub Group Analysis - Crop Cotton/Sesame/Maize

	Planted Hybrid Maize
Treatment	0.154
	(2.80)**
Crop: Sesame	0.077
	(0.99)
Crop: Maize	0.025
	(0.41)
Treatment x Crop: Sesame	-0.144
	(2.34)**
Treatment x Crop: Cotton	0.007
	(0.11)
Constant	0.148

	(2.49)**
R^2	0.08
N	948

* *p*<0.1; ** *p*<0.05; *** *p*<0.01

The regression estimates the effect of the above variables on the dependent variable planting of hybrid maize. The specification uses buyer fixed effects and clusters standard errors at the buyer level. T-Statistics are in parentheses. Results from the Wald Test show that the interaction is statistically significant.

Table 7: Sub Group Analysis - District Nwoya/Gulu/Amuru

	Planted Hybrid Maize
Treatment	-0.027
	(1.62)
District: Amuru	-0.321
	(4.35)***
Treatment x District: Gulu	0.097
	(2.43)**
Treatment x District: Nwoya	0.212
	(2.82)**
Constant	0.297
	(20.11)***
R^2	0.08
N	974

* *p*<0.1; ** *p*<0.05; *** *p*<0.01

The regression estimates the effect of the above variables on the dependent variable planting of hybrid maize. The specification uses buyer fixed effects and clusters standard errors at the buyer level. T-Statistics are in parentheses. Results from the Wald Test show that the interaction is statistically significant.

Table 8: Sub Group Analysis - Gender Male/Female

	Planted Hybrid Maize
Treatment	0.117
	(3.65)***
Male	0.119
	(2.42)**
Treatment x Male	-0.067
	(1.08)
Constant	0.135
	(5.25)***
R^2	0.08
N	974

* *p*<0.1; ** *p*<0.05; *** *p*<0.01

The regression estimates the effect of the above variables on the dependent variable planting of hybrid maize. The specification uses buyer fixed effects and clusters standard errors at the buyer level. T-Statistics are in parentheses.

Appendix C: Descriptive Statistics

Table 9: Summary statistics on full sample

	Mean	Standard deviation	Number of observations
Maize knowledge: Seeds per hole	0.3	0.5	974
Maize knowledge: KGs per acre	0.3	0.4	974
Farmed hybrid maize in last 12 months	0.3	0.5	974
Farmed maize in last 12 months	0.8	0.4	972
Age	37.4	13.9	974
Male	0.5	0.5	974
Sold Maize	0.2	0.4	974
Shillings received for crops	48,928.0	128,801.2	895

Appendix D: Survey Content

GADC Hybrid Seed Evaluation – Baseline Survey

Fill out the following survey for all farmers (over 18 years old) who sell any crop to GADC.

Please note that the following codes apply to all questions:

97	Other	98	Refuse to respond	99	Do not know

Read aloud: **I am an enumerator for a company called IDinsight. I would like to ask you some questions about your farming practices. Your answers may help provide support to farmers in the future. The survey should take less than 10 minutes.**

I am not a representative of GADC, and your answers will in no way affect your contract with GADC. Your answers will not be shared with anyone. You may refuse to answer any question, and you may choose to end the interview at any time.

Do you consent to participate in today's survey? YES NO

Section 1: Metadata *Enumerator should fill this in after consent is given and before interview begins.*		
1.	Enumerator name	
2.	Interview Date and Start Time	D D / M M / Y Y
		H H : M M
3.	GADC Store (Select one: Buyer)	

Section 2: Household Information		
4.	Given name of respondent / farmer	
5.	Family name of respondent / farmer	
6.	Farmer Code *If the farmer does not have a code because he / she only sells conventional cotton to GADC, then enter "0.0.0".* *If the farmer does not know their code, please enter "99.99.99".*	__ __ . __ __ . __ __
7.	District (of store)	
8.	Parish (of store)	
9.	Village (of store)	
10.	Gender *You may fill this in without asking the respondent.*	M F
11.	Age *You can write in the year that the respondent was born.*	
12.	Phone Number 1	
	Who does this phone belong to?	Select one: 0 – Farmer 1 – Family member 2 – Neighbor or friend 3 – Village leader 97 – Other 98 – Refuse to respond 99 – Don't know
13.	Phone Number 2	
	Who does this phone belong to?	Select one: 0 – Farmer 1 – Family member 2 – Neighbor or friend 3 – Village leader 97 – Other 98 – Refuse to respond 99 – Don't know

14.	What is the highest level of education you have attained?	Select one: 0 – None 1 – Some primary 2 – Completed primary 3 – Some secondary 4 – Completed secondary 5 – Diploma / Certificate 6 – University 97 – Other 98 – Refuse to respond 99 – Don't know

Section 3: Farming Behavior		
15.	In the last 12 months, did you household grow maize? ***If the answer to Question 15 is NO, skip to Question 20.***	Y N
16.	In the last 12 months, on how much land did you grow maize?	
		Select one: 0 – Acres 1 – Square meters 2 – Square feet 3 – Square yards 4 – Square sticks 5 – Hectares 6 – Decimals 97 – Other 98 – Refuse to respond 99 – Don't know
17.	In the last 12 months, have you planted hybrid maize?	Y N
18.	In the last 12 months, have you purchased hybrid maize seeds?	Y N
19.	***If the answer to Question 17 is YES:*** In the last 12 months, about what proportion of your maize plot was planted with hybrid maize seeds?	Select one: 0 – Less than 25% 1 – 26% - 50% 2 – 51% - 75% 3 – 76% - 100% 98 – Refuse to respond 99 – Don't know
20.	For the next planting season, do you plan to grow maize?	Y N
21.	***If the answer to Question 20 is YES:*** For the next planting season, do you plan to grow hybrid maize?	Y N
22.	What crop have you sold to GADC today?	Select multiple: 0 – Cotton 1 – Sesame / Simsim 2 – Maize 3 – Chili 4 - Sunflower
23.	In the past 12 months, what crops have you grown?	Select multiple: 0 – Cotton 1 – Sesame / Sim-sim 3 – Chili 4 – Sunflower 5 – Rice 6 – Sorghum 7 – Cassava 8 – Sweet Potato 9 – Irish Potato 10 – Yams 11 – Beans 12 – Groundnuts 13 – Fruit tree (banana, pawpaw, etc.) 14 – Coffee 15 – Pineapple 16 – Vegetables (tomato, cabbage, etc.) 17 – Pigeon peas 18 - Soya

		97 – Other 98 – Refuse to respond 99 – Don't know

We have reached the final section of the survey. This section looks at farmer willingness to purchase hybrid seeds. For this section, only a small number of farmers will be randomly selected to participate. Farmers who are selected to participate will be able to purchase hybrid seeds from me at the same price as in town.

Conduct the lottery: *Select one lottery ticket out of your bag. Enter the number in the box below.*

Lottery number:		If the lottery number is **even**, proceed with the rest of the survey. If the number is **odd**, the survey has completed.

Section 4: Hybrid Maize Sale		
Read aloud: GADC and IDinsight are offering Longe 7H hybrid maize seeds for sale to a small number of randomly-selected farmers who sell crops to GADC. These hybrid seeds have been purchased from a reliable store and will be offered at the same price as at a normal store.		
24.	Would you like to purchase hybrid maize seeds? You may purchase one 2-kg bag.	Y N
25.	***If answer to Question 23 is NO:*** Why have you chosen not to purchase hybrid seeds?	Select multiple: 0 – Too expensive 1 – No money available 2 – Do not want hybrid seeds 3 – Unfamiliar with hybrid seeds 4 – Already going to town 5 – Do not trust this source 6 – Need to discuss with family 97 – Other 98 – Refuse to respond 99 Don't know
	If other, please describe:	
Read aloud if farmer buys seeds: Please be sure to store the seeds some where safe and dry. The seeds should be kept off the ground and away from the ceiling. Please do not sell these seeds to your friends, neighbors, or other community members.		

GADC Hybrid Seed Evaluation – Endline Survey

Fill out the following survey for all farmers who were surveyed in the baseline.

Please note that the following codes apply to all questions:

97	Other	98	Refuse to respond	99	Do not know

Read aloud: **I am an enumerator for a company called IDinsight. I would like to ask you some questions about your farming practices. Your answers may help provide support to farmers in the future. The survey should take less than 45 minutes.**

I am not a representative of GADC, and your answers will in no way affect your contract with GADC. Your answers will not be shared with anyone. You may refuse to answer any question, and you may choose to end the interview at any time.

Do you consent to participate in today's survey? YES NO

Section 1: Metadata *Enumerator should fill this in after consent is given and before interview begins.*		
26.	Enumerator name	
27.	Interview Date and Start Time	D D / M M / Y Y H H : M M
28.	Farmer ID (from the list)	

Section 2: Household Information *Questions 4 – 8 will be pre-loaded.*		
29.	What is your (the farmer's) given name?	
30.	What is your (the farmer's) family name?	
31.	Farmer Code *A farmer's code consist of three numbers: Field Office code, Lead Farmer code, and Farmer Code.* *If the farmer does not have a code because he / she only sells conventional cotton to GADC, then enter "0.0.0".* *If the farmer does not know their code, please enter "99.99.99".*	___ ___ . ___ ___ . ___ ___
32.	What is your age? *If the farmer does not remember their age, but does remember year, please enter 99 and go to the next question.*	
33.	**If 99 to the previous question:** What year were you born in?	
34.	How many people live in your household? *Define HH as "eating from the same pot/stove for more than 50% of the time over the last six months.*	
35.	Are you the head of household or the spouse of the head of household?	Select one: 0 – No 1 – Head of household 2 – Spouse of head of household

Section 3: Household Income		
36.	What activity earns the **most** income for the household?	0 – Non-agricultural activity 1 – Agricultural activity
37.	What crop produced the **most** income for your household last season? *Define last season as any crops harvested in the past 6 months.* *If the farmer did not sell any crops, ask which crop was the largest quantity.*	Select one: 0 – Cotton 1 – Sesame / Sim-sim 3 – Chili 4 – Sunflower 5 – Rice 6 – Sorghum

		7 – Cassava 8 – Sweet Potato 9 – Irish Potato 10 – Yams 11 – Beans 12 – Groundnuts 13 – Fruit tree (banana, pawpaw, etc.) 14 – Coffee 15 – Pineapple 16 – Vegetables (tomato, cabbage, etc.) 17 – Pigeon peas 18 - Soya 97 – Other 98 – Refuse to respond 99 – Don't know
38.	What crop produced the **second most** income for your household last year? *Define last season as any crops harvested in the past 6 months.* *If the farmer did not sell any crops, ask which crop was the largest quantity.*	Select one: 0 – Cotton 1 – Sesame / Sim-sim 3 – Chili 4 – Sunflower 5 – Rice 6 – Sorghum 7 – Cassava 8 – Sweet Potato 9 – Irish Potato 10 – Yams 11 – Beans 12 – Groundnuts 13 – Fruit tree (banana, pawpaw, etc.) 14 – Coffee 15 – Pineapple 16 – Vegetables (tomato, cabbage, etc.) 17 – Pigeon peas 18 - Soya 97 – Other 98 – Refuse to respond 99 – Don't know

Section 4: Maize Adoption and Behavior		
39.	Did you grow maize LAST season? *Define last season as any crops harvested in the past 6 months.*	Y N
If the answer to Question 14 is NO, skip to Question 16		
40.	Did you sell more than half of the maize you grew LAST season?	Y N
41.	Is your household growing maize during the current season?	Y N
If the answer to Question 16 is NO, skip to Question 38.		
42.	On how much land are you growing maize this season?	Select one: 0 – Acres 1 – Square meters 2 – Square feet 3 – Square yards 4 – Square sticks 5 – Hectares 6 – Decimals 97 – Other 98 – Refuse to respond 99 – Don't know
43.	What percentage of your maize plot was inter-cropped with another crop?	0 – 0-25% 1 – 25-50% 2 – 50-75%

		3 – 75-100% 98 – Refuse to respond 99 – Don't know
44.	From how many sources did you obtain maize seed for THIS season?	
Repeat Q20 - 34 for each source of maize		
45.	Where did you get the maize seeds you planted from this source?	Select one: 0 – Replanted seeds from previous season 1 – Got seeds from friend / neighbor 2 – Got seeds from travelling salesperson (not specific store) 3 – Got seeds from store 4 – Got seeds from government extension worker 5 – Got seeds from NGO 6 – Got seeds from open market 97 – Other 98 – Refuse to respond 99 – Don't know
46.	**If NGO:** What is the name of the NGO you received the seeds from?	
Q22 – Q23 only if they replanted seeds from previous season		
47.	When did you originally acquire the seed?	Select one: 0 – Less than 6 months ago 1 – 6 - 12 months ago 2 – 1 – 2 years ago 3 – More than 2 years ago 98 – Refuse to respond 99 – Don't know
48.	Did you pay for the seed when you originally acquired it?	Select one: 0 – Received seeds for free 1 – Paid for seeds 98 – Refuse to respond 99 – Don't know
49.	Did you have to pay for the seeds or did you receive them for free?	Select one: 0 – Received seeds for free 1 – Paid for seeds 98 – Refuse to respond 99 – Don't know
50.	What is the quantity of seeds you obtained from this source?	
51.	Select unit:	Select one: 0 – KGs 1 – Apwotis (2.5 = 1kg) 2 – Mugs (2 = 1kg) 3 – Nice cups (4 = 1kg) 97 – Other 98 – Refuse to respond 99 – Don't know
52.	**If they selected they paid for seed:** How much did you pay for seeds from this source (shillings)? *This is TOTAL price, no per unit price. For example, if the respondent paid 1,000 shillings per KG for 15 KGs, enter 15,000. Enter 99 for Don't Know.*	
53.	What is the name of the maize seed strand you obtained from this source?	
54.	Why did you choose to obtain seed from this source?	Select multiple: 0 – Close to home 1 – Best price 2 – Trust the source 3 – Was given the seed for free 97 – Other

		98 – Refuse to respond 99 – Don't know
55.	When did you obtain the seeds from this source?	Select one: 0 – Less than 1 week before planting 1 – 1-2 weeks before planting 2 – 2-4 weeks before planting 3 – 1-2 months before planting 4 – 2-3 months before planting 5 – 3+ months before planting 98 – Refuse to respond 99 – Don't know
56.	Why did you choose to obtain the seeds at this time?	Select one: 0 – Cash availability 1 – Worried about seeds spoiling 2 – Only available at that time 3 – No place to store 4 – Price is cheaper then 5 – Access is easier at that time 97 – Other 98 – Refuse to respond 99 – Don't know
57.	Did any of the seeds from this source spoil before you were able to plant them?	Y N
58.	What was the type of the seed you obtained from this source?	0 – Local breed 1 – Hybrid 97 – Other 98 – Refuse to respond 99 – Don't know
End repeat group		
59.	**If none of the seeds were (self-reported) hybrids:** Do you know where you can obtain hybrid maize seed?	Y N
Next three questions only if yes to previous question		
60.	From which sources can you obtain hybrid maize seeds?	Select multiple: 0 – Yourself (e.g. replanting own seeds) 1 – Friend / neighbor 2 – Travelling salesperson (not specific store) 3 – Store 4 – Government program 5 – NGO 6 – Open market 97 – Other 98 – Refuse to respond 99 – Don't know
61.	How likely do you think it is that the hybrid seeds you purchase would be high quality?	0 – Very likely 1 – Likely 2 – Unlikely 3 – Very unlikely 98 – Refuse to respond 99 – Don't know
62.	Why did you choose not to obtain hybrid maize seed this season?	Select one: 0 – Distance to seller 1 – Cost of seeds 2 – Uncertainty about yield / quality 3 – Negative experiences of other farmers 97 – Other 98 – Refuse to respond 99 – Don't know

Section 5: Access to other inputs

63.	Which input is the MOST difficult for you to obtain?	Select two: 0 – Seeds 1 - Fertilizer 1 – Pesticide 2 – Herbicide 97 - Other 98 – Refuse to respond 99 – Don't know
64.	Which input is the SECOND MOST difficult for you to obtain?	Select two: 0 – Seeds 1 - Fertilizer 1 – Pesticide 2 – Herbicide 97 - Other 98 – Refuse to respond 99 – Don't know
Repeat Q39-40 for both inputs (if NOT 98 or 99)		
65.	Why is it difficult to obtain _____?	Select multiple: 0 – Distance to seller 1 – Price 2 – Not always available 97 – Other 98 – Refuse to respond 99 – Don't know
66.	Have you used _____ before?	Y N

Section 6: Future Potential of Hybrid Seed Sale		
67.	If GADC sold high-quality hybrid maize seeds before the next planting season for ~ 5,500 UGX / KG would your neighbor purchase them?	Y N
68.	If GADC sold high-quality hybrid maize seeds before the next planting season for ~ 5,500 UGX / KG would you purchase them?	Y N
69.	**If yes to Q41:** How many KGs of high-quality hybrid maize seeds would you be willing to purchase at ~5,500 UGX / KG?	
70.	**If yes to Q41:** What quantity of high-quality hybrid maize seeds would you be willing to purchase at ~5,500 UGX / KG?	
71.	Select unit:	Select one: 0 – KGs 1 – Apwotis (2.5 = 1kg) 2 – Mugs (2 = 1kg) 3 – Nice cups (4 = 1kg) 97 – Other 98 – Refuse to respond 99 – Don't know
72.	**If no to Q41:** Why not?	Select one: 0 – Cost of seeds 1 – Uncertainty about yield / quality 2 – Negative experiences of other farmers 3 – Do not trust GADC 4 – No training / knowledge with hybrid seed 97 – Other 98 – Refuse to respond 99 – Don't know
73.	**If farmer did NOT accept lottery offer, but selected yes to Q43:** You chose not to purchase hybrid maize seeds in January, but say you would purchase hybrid maize seeds next year. Why is that?	Select one: 0 – More time to think about it 1 – Will have more money saved by then 2 – Can plan ahead

		3 – Expect to have training / knowledge on hybrid seed by then 97 – Other 98 – Refuse to respond 99 – Don't know

Section 7: Maize Best Practices		
74.	How many seeds should you place in each hole?	
75.	How many kilograms of seeds should you plan per acre?	
76.	Have you received any information on how to use hybrid seeds from GADC or any other organization?	Y N
77.	Have you attended a GADC training lasting 1.5 hours or more in the past 12 months?	Y N